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EXAMINER	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/539,637	BOHLIN ET AL.	
	Examiner	Art Unit	
	Julie Ha	1654	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 October 2007*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *15-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *15-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Amendment after Non-final rejection filed on October 15, 2007 is acknowledged. Claims 1-14 have been cancelled and new claims 15-26 have been added. Claims 15-26 are pending in this application. Applicant elected without traverse Group III (claim 11) drawn to a method of using a peptide to prevent on-growth of biological organisms on objects or living beings in the reply filed on February 27, 2007. Claims 15-26 are examined on the merits in this office action.

Withdrawn Rejections

1. All rejections cited in the previous office action not cited herein are hereby withdrawn due to Applicant's amendments.

Maintained Rejections

35 U.S.C. 112, 1st

2. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

3. Claims 15-20 and 26 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The MPEP states that the purpose of the written description requirement is to ensure that the inventor had possession, as

of the filing date of the application, of the specific subject matter later claimed by him.

The courts have stated:

"To fulfill the written description requirement, a patent specification must describe an invention and do so in sufficient detail that one skilled in the art can clearly conclude that "the inventor invented the claimed invention." Lockwood v. American Airlines, Inc., 107 F.3d 1565, 1572, 41 USPQ2d 1961, 1966 (1997); In re Gosteli, 872 F.2d 1008, 1012, 10 USPQ2d 1614, 1618 (Fed. Cir. 1989) (" [T]he description must clearly allow persons of ordinary skill in the art to recognize that [the inventor] invented what is claimed."). Thus, an applicant complies with the written description requirement "by describing the invention, with all its claimed limitations, not that which makes it obvious," and by using "such descriptive means as words, structures, figures, diagrams, formulas, etc., that set forth the claimed invention." Lockwood, 107 F.3d at 1572, 41 USPQ2d at 1966." Regents of the University of California v. Eli Lilly & Co., 43 USPQ2d 1398.

4. The MPEP lists factors that can be used to determine if sufficient evidence of possession has been furnished in the disclosure of the Application. These include "level of skill and knowledge in the art, partial structure, physical and/or chemical properties, functional characteristics alone or coupled with a known or disclosed correlation between structure and function, and the method of making the claimed invention. Disclosure of any combination of such identifying characteristics that distinguish the claimed invention from other materials and would lead one of skill in the art to the conclusion that the applicant was in possession of the claimed species is sufficient." MPEP 2163.

5. Further, for a broad generic claim, the specification must provide adequate written description to identify the genus of the claim. In Regents of the University of California v. Eli Lilly & Co., the court stated:

"A written description of an invention involving a chemical genus, like a description of a chemical species, 'requires a precise definition, such as by structure, formula, [or] chemical name,' of the claimed subject matter sufficient to distinguish it from other materials. Fiers, 984 F.2d at 1171, 25 USPQ2d at 1606; In re Smythe, 480 F.2d 1376, 1383, 178 USPQ 279, 284-85 (CCPA 1973) ("In other cases, particularly but not necessarily, chemical cases, where there is unpredictability in performance of

certain species or subcombinations other than those specifically enumerated, one skilled in the art may be found not to have been placed in possession of a genus. . . ."). Regents of the University of California v. Eli Lilly & Co., 43 USPQ2d 1398.

6. The MPEP further states that if a biomolecule is described only by a functional characteristic, without any disclosed correlation between function and structure of the sequence, it is "not sufficient characteristic for written description purposes, even when accompanied by a method of obtaining the claimed sequence." MPEP 2163. The MPEP does state that for generic claim the genus can be adequately described if the disclosure presents a sufficient number of representative species that encompass the genus. MPEP 2163. If the genus has a substantial variance, the disclosure must describe a sufficient variety of species to reflect the variation within that genus. See MPEP 2163. Although the MPEP does not define what constitute a sufficient number of representative, the Courts have indicated what do not constitute a representative number species to adequately describe a broad generic. In Gostelli, the Court determined that the disclosure of two chemical compounds within a subgenus did not describe that subgenus. In re Gostelli, 872 F.2d at 1012, 10 USPQ2d at 1618.

7. In the instant case, the claims are drawn to a method of preventing comprising applying an agent on a surface of said object or living being, said agent comprising at least one cyclotide, or a fraction from an extraction process containing a mixture of cyclotide, and suitable binding agent. The generic statement cyclotide, or a fraction from an extraction process containing a mixture of cyclotide and suitable binding agent do not provide ample written description for the compounds since the claims do not describe a single structural feature. The specification does not clearly define or provide examples of what qualify as compounds of the claimed invention.

8. As stated earlier, the MPEP states that written description for a genus can be achieved by a representative number of species within a broad generic. It is unquestionable claim 15 is broad generics with respect all possible compounds encompassed by the claims. The possible structural variations are limitless to any class of peptide or a peptide-like molecule that can form cyclotides (cyclic peptide (see paragraph [0003]). It must not be forgotten that the MPEP states that if a peptide is described only by a functional characteristic, without any disclosed correlation between function and structure of the sequence, it is "not sufficient characteristic for written description purposes, even when accompanied by a method of obtaining the claimed sequence." MPEP 2163. The possible structural variations are limitless to any class of peptide or a peptide-like molecule or organic molecules and other synthetic molecules that can be used as a binding agent. Here, though the claims may recite some functional characteristics, the claims lack written description because there is no disclosure of a correlation between function and structure of the compounds beyond compounds disclosed in the examples in the specification. Moreover, the specification lack sufficient variety of species to reflect this variance in the genus since the specification does not provide any examples of derivatives. The specification is void of organic molecules that functions as a peptide-like molecule that qualify for the functional characteristics claimed as a peptide or a peptide-like molecule or other peptidic molecules that can be cross-linked to form a cyclic peptide, and other synthetic peptide or peptide-like molecule or other peptidomimetics that can function as cyclic peptides and binding agents.

9. The specification is limited to the peptide or peptide-like molecules that belong to the same class of cyclopeptide, cycloviolacin O2. The specification discloses that cycloviolacin O2 consist of almost 50 members (see paragraph [0008]). The specification further discloses that cycloviolacin O2 has an antifouling effect against barnacles (see paragraph [0009]). Additionally, the specification discloses examples of cyclotides (about 45 that all have 6 cysteine residues with varying lengths of loops in between the cysteine residues) usable for the prevention of on-growth of biological organisms (see paragraph [0032]). The working example only describes the cyclotide cycloviolacin O2 (see paragraph [0051]). The specification does not describe any other cyclotides, such as synthetic amino acids comprising non-natural amino acids (i.e. D-amino acids, or beta amino acids and so on) or any other type of peptide or peptide-like molecules, that act as cyclotides that are formed from organic molecules that act like a peptide or peptide-like molecule. Additionally, the specification does not disclose any other cyclic peptides that can be formed by any peptide molecules. For example, there are varying lengths, varying amino acid compositions, and numerous distinct qualities that make up the genus. The specification does not disclose any cyclic peptides that may only have 3 cysteine residues. Additionally, it is known in the art that cyclization of linear peptides increase potency, selectivity and stability. Grasso et al teach methods and compositions containing leptin peptides (see abstract) and leptin analogs with increase in potency and stability of biologically active leptin-related peptides (see column 36, lines 38-40). Furthermore, the reference teaches that another strategy which can be used to develop peptide analogs of increased potency, selectivity and stability

relies on the introduction of covalent cross-links into a peptide sequence to conformationally and topographically constrain the peptide backbone. Macrocyclization is often accomplished by forming and amide bond between the peptide N- and C-termini, between a side chain and the N- or C-termini or between two amino acid side chains (see column 36, lines 53-61). Thus, any peptide can be formed into a cyclic peptide and the specification does not disclose all possible cyclotides (e.g., 10mer, 20mer, 45mer, 100mer, 200mer and so on). Furthermore, the specification does not provide sufficient amount of cyclotides that is recited in claim 16. If there are 1 to about 20 amino acids in between each cysteine residues, this implies that there is a cyclotide that is at least 12 amino acids in lengths up to a cyclotide that has 126 amino acids in lengths. Since there are 20 naturally occurring amino acids, this means that there are innumerable numbers of possibilities for the cyclotide. When one factors in the non-natural amino acids and amino acid mimetics, the number of possible cyclotide that can be formed from Formula I is vast. The specification further does not describe sufficient number of binding agent. The specification discloses that "a binding agent such as an organopolysiloxane, e.g. a low molecular mass alkoxy-functional silicone resin, a silicone rubber or an organosilicon copolymer (see paragraph [0041]). The specification does not define what a binding agent is, thus, a binding agent can be anything, such as peptide, adhesive, polymers, chemical agents, and so on. There is not sufficient amount of examples provided to encompass the numerous characteristics of the whole genus claimed.

10. The description requirement of the patent statute requires a description of an invention, not an indication of a result that one might achieve if one made that invention. See In re Wilder, 736 F.2d 1516, 1521, 222 USPQ 369, 372-73 (Fed. Cir. 1984) (affirming rejection because the specification does "little more than outlin[e] goals appellants hope the claimed invention achieves and the problems the invention will hopefully ameliorate"). Accordingly, it is deemed that the specification fails to provide adequate written description for the genus of the claims and does not reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the entire scope of the claimed invention.

Response to Applicant's Arguments

11. Applicant argues that peptide is identified as one member of the family of cyclotides, which consists of 50 members. Applicant further argues that the specification discloses that the members of this family exhibit a common structure: cyclotides have a cyclic cysteine knot, an amino acid backbone that is circular, and lack both N- and C-terminals; the cyclotides all contain six cysteine residues involved in three disulfide bridges in a knotted arrangement. One of ordinary skilled in the art would recognize the structure and function of the cyclotides.

12. Applicant's arguments have been fully considered but have not been found persuasive because the number of possibilities of the cyclotide claimed is vast. First, the mere presence of an amino acid backbone that is circular and lacks both N- and C-

terminal ends is not a common structural feature since all cyclic peptides, where cyclization occurs through N- and C-terminal ends and circular amino acid in the back have these structural features. These enumerate in the thousands, with varying sequences. For example, even though Applicant argues that cyclotide consists of 50 members, the possibilities are vast according to general formula recited in claim 16, and the dependent claims 17-20. According to claim 16, X_1 to X_a, X^I_1 to X^I_B, all the way up to X^V_1 to X^V_f can be "same or different and range from 1 to about 20" amino acids. Since there are 6 cysteines that are present, this implies that there are minimum of 12 amino acid residues in a cyclotide sequence. The 6 amino acids may be "same or different", thus this increases the different possibilities of the cyclotide sequence. Further, since there can be up to 20 amino acids, this means that a cyclotide can have up to 126 amino acid residues, and 120 of those residues can be "same or different". This increases the numbers of different cyclotide structures. Further, since there are 20 naturally occurring amino acids as well as non-natural amino acids (D-isomers, β-amino acids, γ-amino acids, ε-amino acids, and amino acid mimetics), the number of cyclotide having 126 amino acid residues are innumerable. Furthermore, as described by the Applicant, "the six cysteine residues are involved in three disulfide bridges in a knotted arrangements". The six cysteine residues may form disulfide bridges with different cysteine residue in the cyclotide sequence, further increasing the numbers of possible cyclotide structures. Furthermore, the specification discloses that a general cyclotide is given in Formula I. The specification does not disclose how the cyclotides are cyclized,

since the Formula I appears to have cyclization occurring from C1 (cysteine) and X^{V}_{f} of the formula. Therefore, the rejection is maintained.

New Grounds for Rejection

35 U.S.C. 112, 2nd

13. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

14. Claims 15-25 rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

15. Claim 15 recites, "a method of inhibiting biological fouling of underwater structures,...". It is unclear what is meant by "biological fouling", since neither the claim nor the specification defines what "fouling" is. According to the dictionary, "fouling" means 1) an encrusted deposit, on a submerged objects, as hull of a ship; 2) to make dirty or foul, pollute, 3) to clog or obstruct; 4) to become entangle or twisted and so on.

16. Claim 16 recites, "said cyclotide(s) have the general formula..."

$$C[X_1 \ldots X_a] \quad C[X^{I}_1 \ldots X^{I}_b] \; C[X^{II}_1 \ldots X^{II}_c] \quad C[X^{III}_1 \ldots X^{III}_d] \quad C[X^{IV}_1 \ldots X^{IV}_e]$$
$$C[X^{V}_1 \ldots X^{V}_f]$$

. This formula is unclear since it is unclear where the disulfide bridge (cyclization) is occurring. For example, according to the formula, it appears that the cyclization is occurring from C (cysteine) residue to an amino acid residue of X^{IV}_e.

17. Claim 17 recites the limitation "a to f" in 2nd line of the claim. There is insufficient antecedent basis for this limitation in the claim. Claim 15 does not recite any "a to f", therefore, the claim lacks antecedent basis.

18. Claim 18 recites the limitation "a, b, c, d, e and f" in lines 1-2 of the claim. There is insufficient antecedent basis for these limitations in the claim. Claim 15 does not recite any "a, b, c, d, e and f", therefore, the claim lacks antecedent basis.

35 U.S.C. 112, 1st

19. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

20. Claims 15-25 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time of the application was filed, had possession of the claimed invention.

New Matter

The claims are drawn to a method of inhibiting biological fouling of underwater structure. The claims in question recite "biological fouling".

Lack of Ipsis Verbis Support

21. The specification is void of any literal support for the "biological" fouling claimed. In the context of fouling, the word "biological" is not present anywhere in the specification. The phrase "marine fouling" was not found in the specification. The phrase "marine fouling organisms, e.g. barnacles, blue mussels, algae and hydroids" was provided in paragraph [0002] of the specification. However, this is not in the context of "biological fouling" since biological is broader than "marine organisms". Biological encompasses everything that is related to, caused by, or affecting life or living organisms. Therefore, there is lack of ipsis verves support for "biological fouling" in the specification.

Lack of Implicit or Inherent Support

22. "While there is not in *haec verba* requirement, newly added claim limitations must be supported in the specification through express, implicit, or inherent disclosure." See MPEP 2163. Thus support can be furnished implicitly or inherently for a specifically claimed limitation. However, the specification lacks any implicit or inherent support for the claimed "biological" fouling. As explained supra, there is no support for any concept of "biological" fouling in the specification. Biological can be anything relating to life or living organisms. The specification recites "marine fouling organisms" (see paragraph [0002]). As described supra, "biological fouling" since biological is broader than "marine organisms". Biological encompasses everything that is related to, caused by, or affecting life or living organisms. Therefore, there is lack of implicit or inherent support for the "biological fouling" claimed.

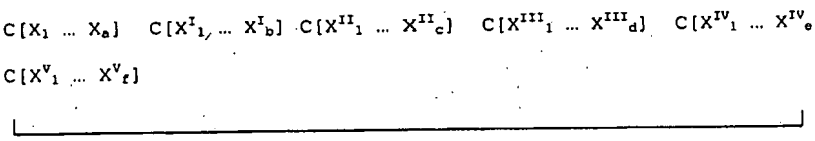
23. Claims 15-20 and 26 are rejected are under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The factors to be considered in determining whether a disclosure meets the enablement requirement of 35 U.S.C. 112, first paragraph, have been described in *In re Wands*, 8 USPQ2d 1400 (Fed. Cir. 1988). Among these factors are: (1) the nature or the invention; (2) the state of the prior art; (3) the relative skill of those in the art; (4) the predictability or unpredictability of the art; (5) the breadth of the claims; (6) the amount of direction or guidance presented; (7) the presence or absence of working examples; and (8) the quantity of experimentation necessary. When the above factors are weighed, it is the examiner's position that one skilled in the art could not practice the invention without undue experimentation.

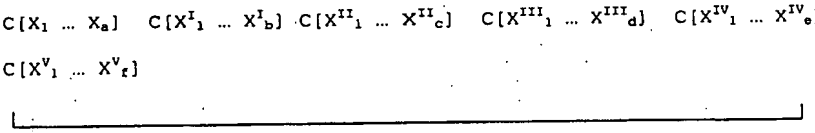
While all of these factors are considered, a sufficient amount for a *prima facie* case is discussed below.

(1) The nature of the invention and (5) the breadth of the claims:

The claims are drawn to a method of inhibiting biological fouling of underwater structures, comprising applying a coating composition having at least one cyclotide, or a fraction from an extraction process containing a mixture of cyclotide, wherein the cyclotide has the general formula



. Because claim 16 recites the cyclotide having the general formula



, each of $[X_1 \ldots X_a]$, $[X^I_1 \ldots X^I_b]$, $[X^{II}_1 \ldots X^{II}_c]$, $[X^{III}_1 \ldots X^{III}_d]$, $[X^{IV}_1 \ldots X^{IV}_e]$, and $[X^V_1 \ldots X^V_f]$, and wherein a, b, c, d, e and f represent the number of amino acid residues in each respective sequence and each of a to f may be the same or different and range from 1 to about 20, the peptide may be of any size which is at least 12 amino acids and at most 126 amino acids.

(2) The state of the prior art and (4) the predictability or unpredictability of the art:

With regards to the effect of amino acid substitution in a peptide or protein, the art is unpredictable.

Rudinger (Peptide Hormones, JA Parsons, Ed., 1976, 1-7) teaches that, "The significance of particular amino acids and sequences for different aspects of biological activity cannot be predicted a priori but must be determined from case to case by painstaking experimental study" (see p. 6). Additionally, SIGMA states that with regards to design of peptide sequences that, "Even for relatively short sequences, there are essential and non-essential (or less important) amino acid residues, although the relative importance of the individual amino acid residues is not always easy to determine" (see p. 1). SIGMA further describes what effect some substitutions may

have, rather than what effect they will have on hydrophobicity, secondary structure (which will affect tertiary and quaternary structure), and solubility.

With regards to prediction of the native conformation of a protein (structure), the art is unpredictable. Berendsen (Science, 1998, 282: 642-643) states, "The prediction of the native conformation of a protein of known amino acid sequence is one of the great open questions in molecular biology and one of the most demanding challenges in the new field of bioinformatics" (see p. 642). Furthermore, Berendsen states that "Folding to the stable native state [computationally] has not (yet) occurred, and the simulations do not contain any relevant statistics on the process. The real protein will fold and refold hundreds to thousands of times until it stumbles into the stable conformation with the lowest free energy. Because this hasn't happened (and couldn't happen) in the simulations, we still cannot be sure of the full adequacy of the force field" (see p. 642).

Further, the effects of a single amino acid substitution can have substantial effects on proteins in structure and/or function and are exemplified by the difference between hemoglobin (Hb) and abnormal hemoglobins, such as sickle-cell hemoglobin (HbS). Voet et al teaches that the mutant hemoglobin HbE [GluB8(26)β to Lys] has, "no clinical manifestations in either heterozygotes or homozygotes" (see p. 235). Further, Hb Boston and Hb Milwaukee both have single point mutations which results in altered binding affinity and ineffective transfer from the Fe(III) to Fe(II) oxidation state. Conversely, a single point mutation in Hb Yakima results in increased oxygen binding by the heme core, and in Hb Kansas, the mutation causes the heme center to remain in the T state upon binding oxygen (rather than structurally rearranging to the R state) (see

p. 236). Further, HbS is a single point mutation, Val to GluA3(6)β (see p. 236), which results in deformation and rigidity of the red blood cell. The mutation also provides protection against most malarial strains.

Given that one could not determine the structure of a protein computationally, and that the effect of amino acid substitution is unpredictable, it flows logically that one would be unduly burdened with experimentation to determine the effect of amino acid substitution(s) in a peptide or protein, with regards to structure, function, or physical/chemical properties. Therefore, making any peptide having at least 18 amino acids that has the same activity as the claimed peptide, one would be unduly burdened with experimentation to determine the effect of amino acid content, substitution(s), addition and deletions in a peptide or protein, with regards to structure, function, or physical/chemical properties.

(3) The relative skill of those in the art:

The relative skill of those in the art is high.

(6) The amount of direction or guidance presented and (7) The presence or absence of working examples:

The specification is limited to the peptide or peptide-like molecules that belong to the same class of protein, cyclotide (cyclic peptides). The specification discloses that plant peptide cycloviolacin O2, isolated form the Sweet violet, Viola odorata L. (Violaceae) (see paragraph [0007]). Further, the specification discloses that this peptide

is one member of the family of cyclotide, which consist of almost 50 members, known naturally occurring cyclotides have 28-37 amino acids (see paragraph [0008]). The specification discloses 43 known cyclotides (see paragraph [0032] and claim 23). The working example describes the extraction and isolation of cycloviolacin O2 (see Example 1). Example 2 discloses the effect of cycloviolacin O2 on settlement of mortality of B. improvisus (algae) and Figures 2 indicates dose dependent inhibition of settlement (see Example 2 and FIG 2). Example 3 describes the extraction and fractionation of plant material, fraction P (Viola odorata extract) and its effect on antifouling effect of B. improvisus (algae) (see FIG 4 and Example 3). Example 4 describes testing of Fraction P of V. odorata on plexiglass plates. Fraction P was dissolved in a marine paint in two different concentrations, and the plexiglass plates were coated with a single layer of different concentration paints. According to the experiments (no data shown), the experiments carried out in quadruplicates, no settlement of barnacles was observed when the plexiglass was submerged in sea water for 4 to 8 weeks (see Example 4). The working example only describes the cyclotide cycloviolacin O2 and Fraction P isolated from V. odorata (see Examples 1-4). The specification does not describe any other peptides that are at least 12 amino acids in lengths and at most 126 amino acids in lengths, such as synthetic small molecules that are peptide-like molecules that can form peptide bonds, other non-natural amino acids, such as D-amino acids or beta-amino acids. Description of 43 known cyclotide and isolated Fraction P from V. odorata are not sufficient to encompass numerous other proteins and molecules that belong to the same genus. However, the specification does

not provide for the myriad of peptides embraced by the broad generic or for the myriad of peptides which are embraced by at least one amino acid substitution, addition, or deletion, since claim 16 recites that "a to f may be the same or different and range from 1 to about 20." For example, there are varying lengths, varying amino acid compositions, and numerous distinct qualities that make up the genus. Since there are 20 naturally occurring amino acids, the possibilities are limitless. Furthermore, since there are 6 cysteine residues in the cyclotide sequence, disulfide bridges can form randomly, and the specification does not describe how to make the peptides and therefore use the peptides.

(8) The quantity of experimentation necessary:

Considering the state of the art as discussed by the reference above and the high unpredictability and the lack of guidance provided in the specification, one of ordinary skill in the art would be burdened with undue experimentation to make a cyclotide having at least 12 amino acids and at most 126 amino acids, having anti-fouling activity.

Conclusion

24. No claims are allowed.

25. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Julie Ha whose telephone number is 571-272-5982. The examiner can normally be reached on Mon-Fri, 8:00 am to 4:30 pm.

26. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cecilia Tsang can be reached on 571-272-0562. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

27. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Julie Ha
Patent Examiner
AU 1654

11/21/07
ANISH GUPTA
PRIMARY EXAMINER